

Claims

1. (Previously presented) A process for preparing a cold-water soluble extruded starch product that has a solubility greater than 90% in water at 25° C that is film-forming in aqueous solution and that is gelatinized to a gelatinization level, said gelatinization level being at least 95%, the process comprising:

providing a hydroxyalkyl starch, said starch being derivatized with a hydroxyalkyl substituent having from 2 to 6 carbon atoms, said starch being a granular starch having a particle size distribution such that at least 90% by weight of the starch particles pass through a 180 micron screen; and

extruding said starch in an extruder, said extruder having a barrel, a die, and at least one rotating shaft, said barrel having at least first and second zones, said first zone being upstream from said second zone, the conditions in said first zone being insufficient to gelatinize said starch to said gelatinization level and the conditions in said second zone being sufficient to gelatinize said starch to said gelatinization level, said starch being extruded in the presence of total moisture in said barrel no greater than about 25% by weight of said starch, said process including the step of controlling the rotational speed of said shaft to impart a specific mechanical energy to said starch sufficient to result in a soluble extruded starch product that is capable of extrusion through said die at said rotational speed.

2. (Original) A process according to claim 1, the moisture in said barrel not exceeding 22.5% by weight of said starch.

3. (Original) A process according to claim 1, the moisture in said barrel not exceeding 20% by weight of said starch.

4. (Original) A process according to claim 1, the moisture in said barrel not exceeding 17.5% by weight of said starch.

5. (Original) A process according to claim 1, further comprising the step of drying said extruded starch product to a moisture content below about 15% to form a dried product.

6. (Original) A process according to claim 5, said starch product being dried to a moisture content between about 9% and about 12%.

7. (Original) A process according to claim 6, further comprising the step of grinding said dried product.

8. (Withdrawn) An extruded starch product prepared by a process comprising:

providing a hydroxyalkyl starch, said starch being derivatized with a hydroxyalkyl substituent having from 2 to 6 carbon atoms; and

extruding said starch in an extruder, said extruder having a barrel, a die, and at least one rotating shaft, said barrel having at least first and second zones, said first zone being upstream from said second zone, the temperature in said first zone being insufficient to gelatinize said starch and the temperature in said second zone being sufficient to gelatinize said starch, said starch being extruded in the presence of total moisture in said barrel no greater than about 25% by weight of said starch, said process including the step of controlling the rotational speed of said shaft to impart a specific mechanical energy to said starch sufficient to result in a soluble extruded starch product that is capable of extrusion through said die at said rotational speed, said starch being substantially completely soluble in water at 25° C and being film-forming in aqueous solution.

9. (Withdrawn) A starch according to claim 8, said starch having a moisture content below about 15%.

10. (Withdrawn) A starch according to claim 8, said starch having a moisture content ranging from about 9% to about 12%.

11. (Withdrawn) A process for preparing a solution of an extruded starch product, comprising:

providing a hydroxyalkyl starch, said starch being derivatized with a hydroxyalkyl substituent having from 2 to 6 carbon atoms;

extruding said starch in an extruder, said extruder having a barrel, a die, and at least one rotating shaft, said barrel having at least first and second zones, said first zone being upstream from said second zone, the temperature in said first zone being insufficient to gelatinize said starch and the temperature in said second zone being sufficient to gelatinize said starch, said

starch being extruded in the presence of total moisture in said barrel no greater than about 25% by weight of said starch, said process including the step of controlling the rotational speed of said shaft to impart a specific mechanical energy to said starch sufficient to result in a soluble extruded starch product that is capable of extrusion through said die at said rotational speed; and mixing said extruded starch product with water.

12. (Withdrawn) A process according to claim 11, the moisture in said barrel not having exceeded 22.5% by weight of said starch.

13. (Withdrawn) A process according to claim 11, the moisture in said barrel not having exceeded 20% by weight of said starch.

14. (Withdrawn) A process according to claim 11, the moisture in said barrel not having exceeded 17.5% by weight of said starch.

15. (Withdrawn) A process according to claim 5, said product being present in said solution in an amount ranging from 1% to 40% on a dry basis.

16. (Withdrawn) A process for preparing a solution of an extruded starch product, comprising:

providing an extruded starch product, said product having been prepared by a process comprising:

providing a hydroxyalkyl starch, said starch being derivatized with a hydroxyalkyl substituent having from 2 to 6 carbon atoms;

extruding said starch in an extruder, said extruder having a barrel, a die, and at least one rotating shaft, said barrel having at least first and second zones, said first zone being upstream from said second zone, the temperature in said first zone being insufficient to gelatinize said starch and the temperature in said second zone being sufficient to gelatinize said starch, said starching being extruded in the presence of total moisture in said barrel no greater than about 25% by weight of said starch, said process including the step of controlling the rotational speed of said shaft to impart a specific mechanical energy to said starch sufficient to result in a soluble extruded starch product that is capable of extrusion through said die at said rotational speed; and mixing said extruded starch product with water.

17. (Withdrawn) A process according to claim 16, the moisture in said barrel not having exceeded 22.5% by weight of said starch.

18. (Withdrawn) A process according to claim 16, the moisture in said barrel not having exceeded 20% by weight of said starch.

19. (Withdrawn) A process according to claim 16, the moisture in said barrel not having exceeded 17.5% by weight of said starch.

20. (Withdrawn) A process according to claim 16, said product being present in solution in an amount ranging from 1 % to 40% on a dry basis.

21. (Withdrawn) The solution formed in accordance with the process of claim 20.

22. (Withdrawn) A process for preparing a film, comprising:

providing a solution of an extruded starch product, said starch product having been prepared by a process comprising

providing a hydroxyalkyl starch, said starch being derivatized with a hydroxyalkyl substituent having from 2 to 6 carbon atoms; and

extruding said starch in an extruder, said extruder having a barrel, a die, and at least one rotating shaft, said barrel having at least first and second zones, said first zone being upstream from said second zone, the temperature in said first zone being insufficient to gelatinize said starch and the temperature in said second zone being sufficient to gelatinize said starch, said starch being extruded in the presence of total moisture in said barrel no greater than about 25% by weight of said starch, said process including the step of controlling the rotational speed of said shaft to impart a specific mechanical energy to said starch sufficient to result in a soluble extruded starch product that is capable of extrusion through said die at said rotational speed;

said solution having been prepared by mixing said starch product with water; and
forming a film from said solution.

23. (Withdrawn) A process according to claim 22, the moisture in said barrel not having exceeded 22.5% by weight of said starch.

24. (Withdrawn) A process according to claim 22, the moisture in said barrel not having exceeded 20% by weight of said starch.

25. (Withdrawn) A process according to claim 22, the moisture in said barrel not having exceeded 17.5% by weight of said starch.

26. (Withdrawn) A process according to claim 22, wherein said solution includes a plasticizer.

27. (Withdrawn) A film formed in accordance with the process of claim 22.
28. (Withdrawn) A process for preparing a seasoning adherence solution, comprising:

mixing water, an extruded starch product, and a seasoning to form a seasoning adherence solution, said extruded starch product having been formed by a process comprising:

providing a hydroxyalkyl starch, said starch being derivatized with a hydroxyalkyl substituent having from 2 to 6 carbon atoms; and

extruding said starch in an extruder, said extruder having a barrel, a die, and at least one rotating shaft, said barrel having at least first and second zones, said first zone being upstream from said second zone, the temperature in said first zone being insufficient to gelatinize said starch and the temperature in said second zone being sufficient to gelatinize said starch, said starch being extruded in the presence of total moisture in said barrel no greater than about 25% by weight of said starch, said process including the step of controlling the rotational speed of said shaft to impart a specific mechanical energy to said starch sufficient to result in a soluble extruded starch product that is capable of extrusion through said die at said rotational speed.

29. (Withdrawn) A process according to claim 28, the moisture in said barrel not having exceeded 22.5% by weight of said starch.

30. (Withdrawn) A process according to claim 28, the moisture in said barrel not having exceeded 20% by weight of said starch.

31. (Withdrawn) A process according to claim 28, the moisture in said barrel not having exceeded 17.5% by weight of said starch.

32. (Withdrawn) The seasoning adherence solution prepared in accordance with claim 28.

33. (Previously presented) A process for preparing a coated food product, comprising:
providing a food substrate;
providing a seasoning adherence solution; and

applying said seasoning adherence solution to said food product in a manner effective to cause seasoning in said solution to adhere to said food substrate; said seasoning adherence

solution having been prepared by mixing water, an extruded starch product, and a seasoning to form said solution, said product having been formed by a process comprising:

providing a hydroxyalkyl starch, said starch being derivatized with a hydroxyalkyl substituent having from 2 to 6 carbon atoms, said starch being a granular starch having a particle size distribution such that at least 90% by weight of the starch particles pass through a 180 micron screen; and

extruding said starch in an extruder, said extruder having a barrel, a die, and at least one rotating shaft, said barrel having at least first and second zones, said first zone being upstream from said second zone, the conditions in said first zone being insufficient to gelatinize said starch to a gelatinization level of 95% and the conditions in said second zone being sufficient to gelatinize said starch to a gelatinization level of 95%, said starch being extruded in the presence of total moisture in said barrel no greater than about 25% by weight of said starch, said process including the step of controlling the rotational speed of said shaft to impart a specific mechanical energy to said starch sufficient to result in a soluble extruded starch product that has a solubility greater than 90% in water at 25° C and that is capable of extrusion through said die at said rotational speed.

34. (Original) A process according to claim 33, the moisture in said barrel not having exceeded 22.5% by weight of said starch.

35. (Original) A process according to claim 33, the moisture in said barrel not having exceeded 20% by weight of said starch.

36. (Original) A process according to claim 33, the moisture in said barrel not having exceeded 17.5% by weight of said starch.

37. (Previously presented) A process according to claim 1, said starch having a solubility of at least 99% in water at 25° C.

38. (Previously presented) A process according to claim 33, said starch having a solubility of at least 99% in water at 25° C.

39. (Previously presented) A process for preparing a cold-water soluble extruded starch product that has a solubility greater than 90% in water at 25° C, that is film-forming in aqueous solution, and that is gelatinized to a gelatinization level, said gelatinization level being at least 95%, the process comprising:

providing a hydroxyalkyl starch, said starch being derivatized with a hydroxyalkyl substituent having from 2 to 6 carbon atoms, said starch being a granular starch having a particle size distribution such that at least 90% by weight of the starch particles pass through a 180 micron screen; and

extruding said starch in an extruder, said extruder having a barrel, a die, and at least one rotating shaft, said process including the step of controlling the rotational speed of said shaft to impart a specific mechanical energy to said starch sufficient to result in a soluble extruded starch product that is capable of extrusion through said die at said rotational speed.

40. (Previously presented) A process according to claim 39, said barrel having at least first and second zones, said first zone being upstream from said second zone, the conditions in said first zone being insufficient to gelatinize said starch to said gelatinization level and the conditions in said second zone being sufficient to gelatinize said starch to said gelatinization level.

41. (Previously presented) A process according to claim 1, said hydroxyalkyl starch comprising a hydroxypropyl starch.

42. (Previously presented) A process according to claim 3, said hydroxyalkyl starch comprising a hydroxypropyl starch.

43. (Previously presented) A process according to claim 39, said starch comprising a hydroxypropyl starch.